

Work Order ID 86953

86953

Page 1

July-09-12 2:59:31 PM

Item ID: D212-664-107 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Crosstube Low Standard Fwd
 Start Date: 7/06/12 Start Qty: 1.00 ***1*** Cust Item ID:
 Required Date: 7/06/12 Req'd Qty: 1.00 ***1*** Customer:
 Reference:

Approvals: Process Plan: MLJ Date: 12/07/10 Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D212-664-147	Rev B (DEO)								
100		0.00							
100	DOCUMENT CONTROL								
DC	Memo	0.00							
Document Control	Photocopy bluefile and create labels as per PPP D212-664-107 D6019-128 (ID = 2.125") = CHG 002								
110		0.00							
110	Packaging								
Packaging	Memo	0.00							
Packaging									
120		0.00							
120	BENDING MACHINE - CROSSTUBES								
CNC Bend 2	Memo	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D212-664-107 using CNC bender program 212-107								

DAS 16 12/09/12 JB

MLJ 12-09-2-1

MO 12/9/12

Jw Mo 12-9-12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

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Start Date: 7/06/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 7/06/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start ***NR1***

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130 *130* QC Quality Control	QC15- Crosstube Dimensional Check Memo	0.00 0.00							
140 *140* Crosstubes Crosstubes	Crosstubes Memo 1-Cut tube as per inspection dwg and deburr ends. ***ensure saw is square*** 2-Position cuffs on tube ensure proper positioning 3-Drill tube as per dwg using DT8577 location #7 & # 212 ULF using jig DT8548 and DT8549 as per QSI 10 4-Transfer drill rivet holes from cuff into tube. 5-Identify cuff position and Batch # on each and identify tube as per dwg D212-664-107. 6- *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** Inspect surface damage 7- Deburr and realodine cuff.	0.00 0.00							

MO 12-9-14

12-9-15

MO 12-9-17

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Run Start ***NR1***

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop ***NR2***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
150									
QC	Memo	0.00							
Quality Control									
160		0.00							
160									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1- CLEAN CROSSTUBE WITH WASH'N WIPE								
180	Outsource process - NDT per QSI038 4.1	0.00							
180									
Outsource2	Memo	0.00							
Outsource process - NDT	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	Liquid Penetrant Inspection as per QSI 038Or Issue P/O: <i>19410</i> LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order								

*DAS
16
2-8*

17/05/16

AS

12-9-18

11-09-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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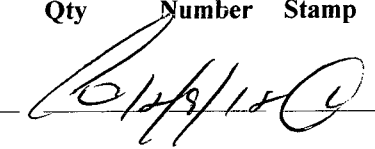
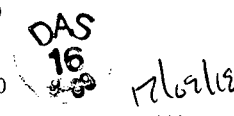

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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190 *190* Packaging Packaging	Packaging Memo Ensure copy of NDT results attached to work order.	0.00 0.00							
200 *200* QC Quality Control	QC5- Inspect part completeness to step on W/O Memo *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** Inspect for damage & ensure results are as per Dwg D212-664-107	0.00 0.00							
202 *202* HandFXtube Hand Finishing Crosstubes	 Memo *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** 1- PRESSURE WASH AND THEN USE WASHH'N WIPE TO CLEAN CROSSTUBE BEFORE CHEMICAL CONVERSION	0.00 0.00							 12-9-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
205	QC7-Inspect Chemical Conversion Coat	0.00							
205									
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
210		0.00							
210	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1-Rivet Cuffs as per Dwg D212-664-147. with Sika flex in Between tube & Cuff A/R SIKAFLEX -241/-291 BATCH: <u>122443</u>								
215	QC5- Inspect part completeness to step on W/O	0.00							
215									
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								

W/O:		WORK ORDER CHANGES					
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Cust Item ID:

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
220	SprayPaint	0.00							
220									
SprayPaint	Memo	0.00							
Spray Painting	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1-Prime inside and outside crosstube as per QSI 005 4.2								
	2-Paint outside crosstube with White Imron as per QSI 005 4.2								
	PRIME: 121746								
	Start Time: 6:30								
	Finish Time: 7:15								
	PAINT: 123003								
	Start Time: 11:15								
	Finish Time: 12:00								
230	QC14- Inspect Spray Paint	0.00							
230									
QC	Memo	0.00							
Quality Control	Wrap in plastic bag to protect from scratches								

AS 12-9-19

1 12-09-20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Customer:

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Run Start *NR1*

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Stop *NR2*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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240

0.00

240

Crosstubes

0.00

Crosstubes

Memo

Crosstubes

1- Assemble as per Dwg D212-664-147

1-Abrade mating surfaces of support and crosstube with 400 grit sandpaper, clean the area with 4105S wash 'n' wipe

2-Install supports with Proseal 890 per DSI9563 and QSI 015
A/R Proseal 890 Batch: 123103

3- Torque bolts as per dwg

250

QC5- Inspect part completeness to step on W/O

0.00

250

Memo

0.00

QC

Quality Control

Al 12-9-19

1 12.09.21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Required Date: 7/06/12 Req'd Qty: 1.00

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Customer:

Reference:

Run Start ***NR1***

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop ***NR2***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
255	Pick Kit	0.00							
255									
Packaging	Memo	0.00							12/09/21 JB
Packaging									
260	QC4- 100% Inspect kits for completeness	0.00							
260									
QC	Memo	0.00							7/12/21
Quality Control									
270	Packaging	0.00							
270									
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D212-664-107								SHIP

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID 86953

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Setup Start *NS1*

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Cust Item ID:

Required Date: 7/06/12 Req'd Qty: 1.00 *1*

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

280

QC21- Final Inspection - Work Order Release

0.00

280

QC

Memo

0.00

Quality Control

MLJ 12-09-21

MF
12-09-21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Picklist Print

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Page 1

Work Order ID: 86953

Parent Item: D212-664-107

Parent Item Name: Crosstube Low Standard Fwd

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 07.09.12 EC verified by: JLM
 IPP Rev:B ECN 1100 08-01-11 DD verified by: EC
 IPP Rev:C Ecn 1121 08-02-25 DD Verified by:ec IPP Rev:D 10.05.27 added pick kit
 DD verf:EC IPP Rev:E 11.10.17 added SEQ 215 DD verf:EC IPP
 REV:F 11.11.03 as per chg003 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D212-664-107TRN
Crosstube Turning Detail

Manufactured No

140 Each 3.0000

1 1

Location	Loc Qty	Loc Code
LG 89480	1	
79679	1	
LG046	2	
79678	1	
86053	1	

① MO 12/9/12

D3659-1
CUFF

Manufactured No

220 Each 9.0000

2 2

Location	Loc Qty	Loc Code
ST482 88419	9	
67005	1	
75173	1	
77032	7	

② MO 12-9-14

CR3212-4-06
CHERRY RIVET

Purchased No

240 Each 372.0000

44 44

Location	Loc Qty	Loc Code
ST330 122378	319	
120521	119	
122141	200	
ST331	53	
112492	18	
112794	8	
119717	27	

AP 12-9-18
44

W/O:		WORK ORDER CHANGES					
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Parent Item Name: Crosstube Low Standard Fwd

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

D3595-063-450
RUBBER CUSHION

Manufactured No

240 Each 105.0895 4 4

AP 12-9-19

Location

Loc Qty

Loc Code

88422

LG	9.28	
82511	9.28	
LG051	85.7	
80161	1.7	
84715	84	
MAT052	10.109474	
67353	2	
68893	6	
70113	0.56	
71354	0.2	
74113	0.349474	
75597	1	

(4)

MS21920-25
Clamp(per MIL-DTL-8783C)

Purchased No

240 Each 136.0000 4 4

AP 12-9-19

Location

Loc Qty

Loc Code

LG050	117	
116264	2	
117998	4	
118142	4	
119339	2	
119746	2	
120475	7	
120920	46	
122204	50	
LG051	19	
121583	19	

(4)

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Parent Item Name: Crosstube Low Standard Fwd

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

D2893-1
2.75 Support

Manufactured No

240 Each 16.0000

2

2

12-9-19

Location

Loc Qty

Loc Code

LG

9

83056

9

LG052

7

72865

2

80271

4

82228

1

Manufactured No

260 Each 33.0000

1

Location

Loc Qty

Loc Code

ST042

33

78933

2

81881

9

83582

10

85228

12

Purchased No

260 Each 42.0000

Location

Loc Qty

Loc Code

342

42

121181

42

Purchased No

260 Each 47.0000

Location

Loc Qty

Loc Code

ST342

47

118422

2

119449

1

120187

4

120423

40

D3428-0
Placard

AN6-35A
BOLT

AN6-36A
Bolt

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Shop Packet Print

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Parent Item Name: Crosstube Low Standard Fwd

Start Qty: 1.00

Required Qty: 1.00

MS21042L6

Purchased

No

260

Each

491.0000

Nut



122141⁶

✓ JB

Location

Loc Qty

Loc Code

ST300

491

117677

25

118384

3

118927

48

119075

215

120308

200

AN960JD616

NAS1149D0663J

Purchased

No

260

Each

0.0000

Washer



123021¹⁸

✓ JB 12/09/21

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Shop Packet Print

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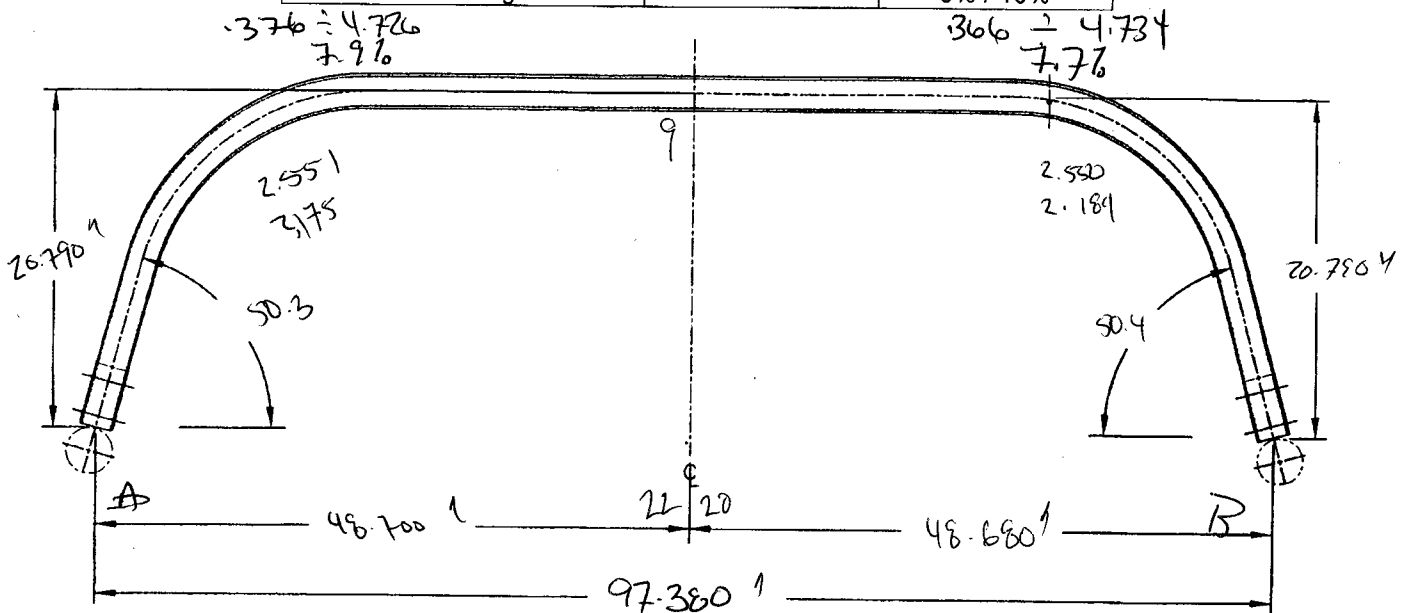
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NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	26953
Description: Crosstube Low Fwd (205/212/412)		Part Number:	D212-664-107
Inspection Dwg: D212-664-147	Rev: B	Page 1 of 1	

Required Dimension	Min	Max
Height	20.79	21.05
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62
Bending Passes	8	--
Crushing	--	6% / 10%



	Side A	MIDDLE	Side B
Bending Passes	22	9	20
Crushing	7.9%		7.7%
Comments			
Side A = 7.9% crushing @ 22 Passes			
Middle = 9 Passes			
Side B = 7.7% crushing @ 20 Passes			

QC15 Inspection	DAS
Date	16 11/09/13

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	
B	10.01.21	Dwg Rev updated	KJ	
C	12.04.16	Added bending, crushing dimensions	KJ	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Item	Qty -147	Qty -147B	Part Number	Description
1	X		D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
2		X	D212-664-147B	CROSSTUBE ASSEMBLY (214 LOW FWD)
3	1	1	D6019-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	2	2	D3659-1	CUFF
7	4	4	MS21920-25	CLAMP (OR MS21920-26)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 126.528±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF
USING VIBRATING STYLUS.
- 7) WEIGHT: D212-664-147 = 24.2 lbs (PER IIN-D212-664)
D212-664-147B = 24.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE
- 9) WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD
BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%
BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF
D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER
INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS.
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE
UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS
NOT BOTTOMED-OUT AFTER TORQUING
- 16) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 17) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 86953 MLJ
12/07/10

DEO ATTACHED

Per ECN #1164
11.07.26
UNDER REVIEW
11.08.13

RELEASED
2009-10-29
NM

B	REVISE GENERAL NOTES/PART LIST: UPDATE TO CURRENT STANDARDS: ADD -147B (ZN C4-2, D4-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	9P		
DRAWN	RF		
CHECKED	9P		
MFG. APPR.	18		
APPROVED	10		
DE APPR.	11		
DATE	09.09.30		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D212-664-147	REV. B SHEET 1 OF 4
TITLE CROSSTUBE (205/212/412 LOW FWD)	SCALE NTS
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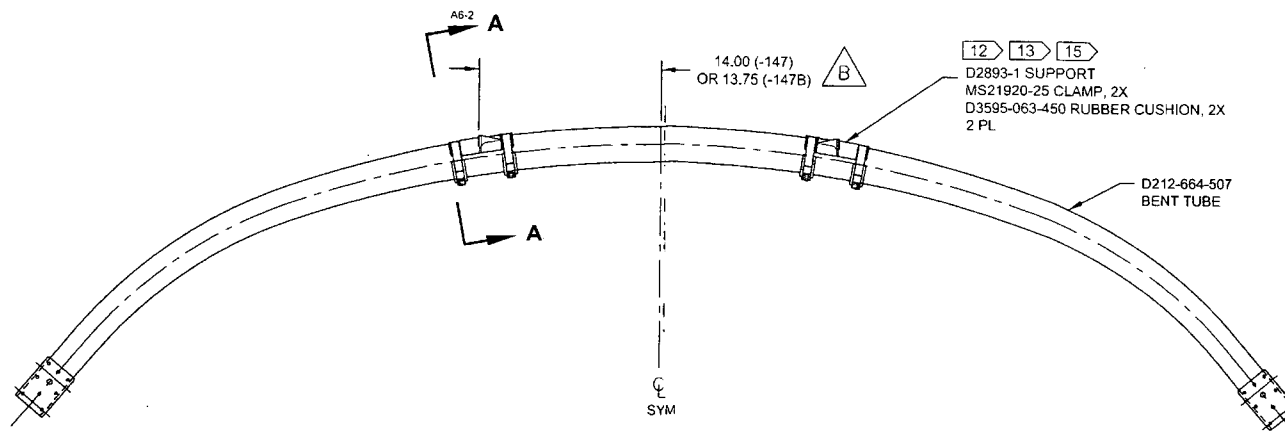
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

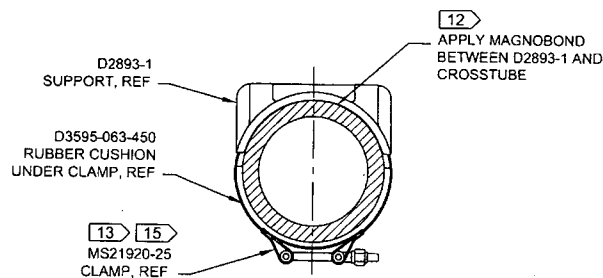
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



**D212-664-147/-147B
ASSEMBLY DETAIL**



SECTION A-A D5-2
SCALE 4X

DEO ATTACHED

ECU #11-014
K.07.28
UNDER REVIEW
CP 11.06.13

RELEASED
2009-10-29

DESIGN	RF	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO. D212-664-147	REV. B
MFG. APPR.	RF	SHEET 2 OF 4	
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

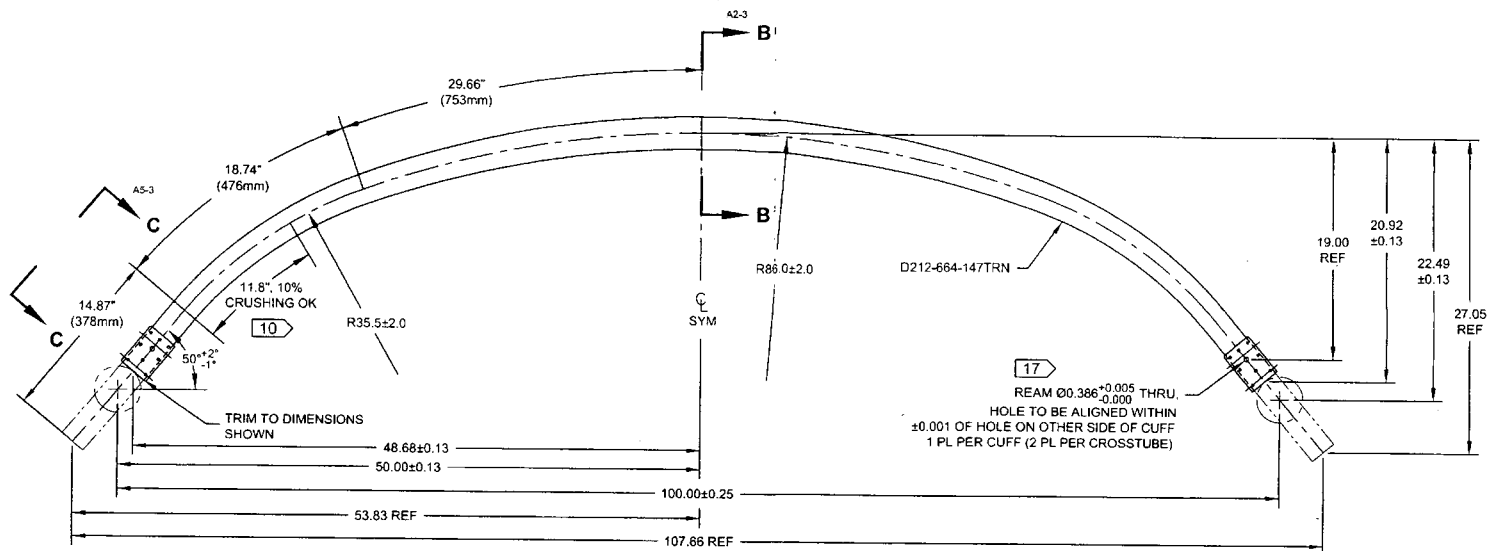
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

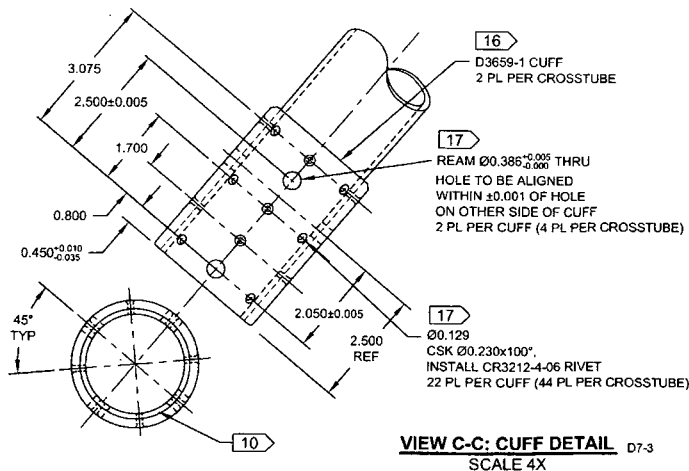
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

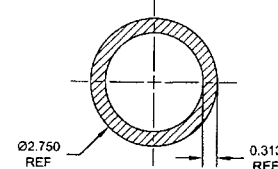
NOTE: Date & initial all entries



D212-664-507
BENDING AND DRILLING DETAIL 10 B



VIEW C-C: CUFF DETAIL 07-3
 SCALE 4X



SECTION B-B DS-3
 SCALE 4X

2011-64.
 09.28
UNDER REVIEW
 09.13

RELEASED
 2009-10-29

DESIGN	97	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	98	DRAWING NO.	REV. B
MFG. APPR.	98	D212-664-147	SHEET 3 OF 4
APPROVED	99	TITLE	SCALE
DE APPR.	99	CROSSTUBE (205/212/412 LOW FWD)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

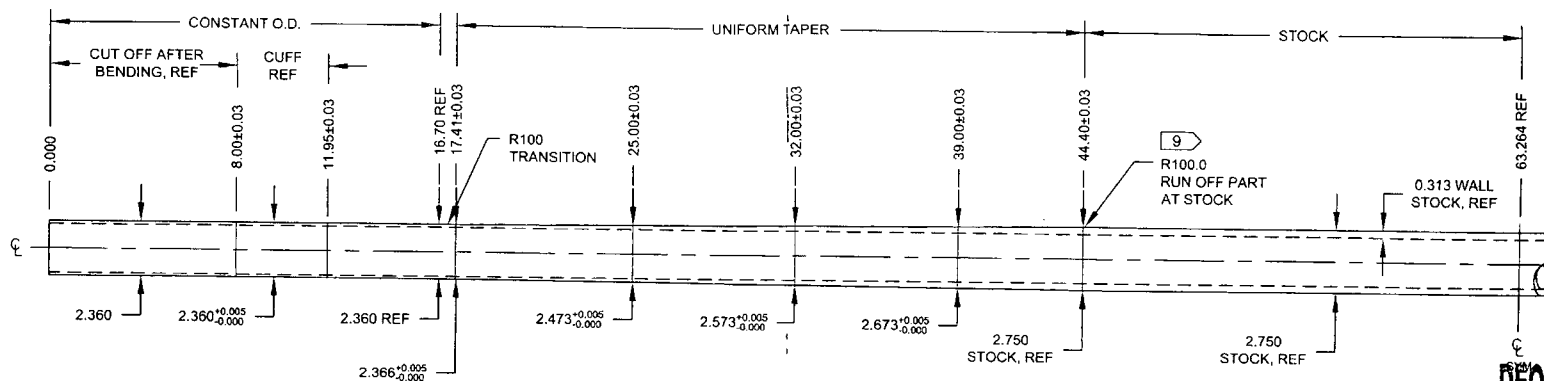
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

86953



**D212-664-147TRN
TURNING DETAIL**

DEO ATTACHED

ECO #1-614
11.09.26

UNDER REVIEW

11/06/13

RELEASED
2009-10-29

DESIGN	RF	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. B
MFG. APPR.	RF	D212-664-147	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2007 BY DART AEROSPACE LTD	
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DRAWING NO. D212-664-147	TITLE CROSSTUBE ASS'Y (205 LOW FWD)	REV. B	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-147-B-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>9</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>18</i>	APPROVED <i>MP</i>		DE APPR. <i>MT</i>		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21		DATE 11.07.21		

PURPOSE:

REPLACE MAGNOBOND WITH PROSEAL.

CHANGE:

IS:

Item	Qty -147	Qty -147B	Part Number	Description
9	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	-----	----------------	---

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2893-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

86953

RELEASED
2011-07-28
VW

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

REFERENCE ONLY**5.2 STANDARD GEAR CROSSTUBES**

Item	-107	-207	-209	Part Number	Description
	X			D212-664-107	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
		X		D212-664-207	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
			X	D412-664-209	CROSSTUBE INSTALLATION, 412 STANDARD AFT
6	1			D212-664-147	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
7		1		D212-664-247	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
8			1	D412-664-249	CROSSTUBE ASSEMBLY, 412 STANDARD AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
45	2			* D3659-1	CUFF
46		2	2	* D3660-1	CUFF
47	44	44		* CR3212-4-06	RIVET (M7885/3-4-06)
48			44	* CR3212-4-07	RIVET (M7885/3-4-07)
50	1	1		D3428-1	PLACARD

*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-147/-247 OR D412-664-249 ASSEMBLIES ABOVE
 NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI
 SKIDTUBES.

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Revision: **G**

Date: 11.08.30



LIQUID PENETRANT TEST REPORT

P- 10161

CLIENT DART AEROSPACE DATE SEPT. 18-2012 PAGE 1 OF 1
ATTENTION LINDA / CHANTALE ACUREN JOB NO. 188-12-C0185 TIME AM ☒ PM ☐
ADDRESS 1270 ABERDEEN ST PO/VO No. AS ADDRESS
11A WILKES BURY ON WORK LOCATION AS ADDRESS
ACCEPTANCE STD. AS ADDRESS REV / DATE AS ADDRESS
PT -> WET Fluorescent Liquid PENETRANT on 5 "CROSSTUBES" 2 "TUBES" 2 "TUBES"
See Below

TEST METHOD WET PROCEDURE No. LT 000 REV / DATE 2007 TECHNIQUE No. LT 000 REV / DATE 2007
MATERIAL 5B, DEC19-128 THICKNESS N/A
SCOPE Performed a WET-Fine LPI on 100% of THE EXTERNAL SURFACE on ITEMS mentioned Below

TEST DETAILS
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 13793 ☒ OUTPUT > 1000 μ W/cm² ☐ AMBIENT < 2 fc
PENETRANT 26-C7 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER H2O MINIMUM DRY TIME >10 MIN. OTHER
DEVELOPER SKD-53 MINIMUM DWELL TIME 30 MIN. LIGHT METER S/N 1098366 CAL DUE DATE oct-23-2012
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE
AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE MET.
TEMPERATURE ☐ < -4°C / 20°F ☐ -4°C / 20°F TO 10°C / 50°F ☒ 10°C / 50°F TO 52°C / 125°F ☐ > 52°C / 125°F
UNITS ☐ METRIC ☐ IMPERIAL

1	TUBE N.O. ID 89610	✓	ITEM ID D4138-1
2	ASSEMBLY W.O. ID 89611	✓	ITEM ID D4139-041
3	CROSSTUBE W.O. ID 85628	✓	ITEM ID D212-664-207 AFT
4	W.O. ID 85629	✓	ITEM ID D212-664-207 AFT
5	W.O. ID 89840	✓	ITEM ID D212-664-201B
6	W.O. ID 86953	✓	ITEM ID D212-664-107 FWD
7	W.O. ID 86954	✓	ITEM ID D212-664-107 FWD

NO RELEVANT INDICATION WAS DETECTED AS PER APPLICABLE STANDARD AT THE TIME OF INSPECTION

Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested service. It is expressly understood that the opinions and observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended to be a warranty of any kind. Acuren Group Inc. is not assuming any responsibility of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and performance of the equipment. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, express or implied, is made by Acuren Group Inc.

SIGNATURES
CLIENT REPRESENTATIVE Andy Sheldon SIGNATURE AS DTR # 285054
TECHNICIAN (SIGNATURE): VES DESPOSER REPORT REVIEWED BY:
NAME (PRINT): VES DESPOSER NAME INITIALS
1ST TECHNICIAN 2ND TECHNICIAN
CGSB LEVEL 2 SNT LEVEL 2 CGSB LEVEL SNT LEVEL
CGSB REG. No. 3049 CGSB REG. No.

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PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

PT Sept 2012